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ABSTRACT

This study investigated discrepancies in partners' skills that arose during children's collaborative problem solving. Some researchers have concluded that expert peers' poor teaching skills seriously curtail the learning potential of expert-novice peer collaboration. This study examined the ways in which experts and novices negotiate and renegotiate their roles, and focused on the novices' behavior in role renegotiation. The hypothesis was that novices whose task skills increased would be more likely to renegotiate their role successfully than novices whose competence did not improve. Forty-eight kindergartners were identified from pretests in which children were asked to copy a Lego model. Expert-novice pairs were formed. Twelve novices were taught building and copying strategies by an adult after the first collaborative session, while the other 12 novices had individual practice sessions. Key comparisons involved changes in novices' roles from the first to the second collaborative session. Results showed that after the experimental manipulation, trained novices were more likely than untrained novices to renegotiate their role successfully. Contrary to expectations, trained novices did not use more sophisticated strategies. They were, however, more persistent in the frequency of their attempts and in the length of their negotiation sequences. (SH)

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"I can do it too": The learners' renegotiation of the zone of proximal development[1]

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There is wide agreement that the contribution of children's collaborative problem solving to cognitive development is maximized in situations where there is a mismatch between partners' skills. How much discrepancy is ideal, however, is still under debate. Whereas Piaget (1932) proposed that situations in which there is only a slight mistmach between children's skills promote the greatest learning, Vygotsky (1978) suggested that situations in which the mismatch between individuals' skills is large, i.e., expert-novice interactions, are more productive[2]. In general, the findings for studies exploring this optimal mismatch issue have been mixed. We concentrate here on the literature on expert-novice peer collaborations.

An examination of research exploring expert-novice peer collaborations reveals that while these interactions can sometimes lead to learning (e.g., Azmitia, 1988; Perret-Clermont 1980), most often they do not (e.g., Bearison, Magzamen, & Filardo, 1984; Ellis & Rogoff, 1986, Foot & Morgan, 1988). Ellis and Rogoff and Foot and Morgan have suggested that one reason for the finding that expert-novice peer interactions often fail to promote the novices' learning is that unlike adults, expert children often fail to provide effective guidance. In particular, they do not explain task strategies, involve the novice in increasingly challenging steps, or transfer control of the task to the novice over time. These researchers concluded that expert peers' poor teaching skills seriously curtail the learning potential of expert-novice peer collaborations. However, this conclusion may be too premature, because it lays the burden of the novices' failure to learn exclusively at the expert's feet. Indeed, to date, most researchers have focused on describing how experts guide cognitive development, failing to detail the influence of the novice on the scaffolding of their own cognitive development. Even when novices' behavior is described (e.g., Azmitia, 1988;, Rogoff & Ellis, 1986), it usually does not receive as much attention as the expert peers' behavior. Arguably, any fruitful

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[1]Poster presented at the biennial meetings of the Society for Research in Child Development, Seattle, Washington 1991.

[2]Matusov (personal communication April 18, 1991) has suggested that Vygotsky's position on the optimal mismatch issue may have been closer to Piaget's than has been assumed. The tendency for non-Soviet researchers to emphasize Vygotsky's views on expert-novice collaborations may stem from the selective translation of his works.

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account of learning in the context of expert-novice peer collaborations will have to devote equal atttention to novices and experts. Only when one conceptualizes expert-novice learning contexts as a relationship that is constantly constructed and reconstructed by both participants (cf. Renninger & Winegar, 1985) can one hope to understand how expert-novice problem solving interactions facilitate or inhibit learning. Along these lines, one issue that needs to be addressed is how experts and novices negotiate and renegotiate their roles; transferring control to the novice is a key dimension of experts' guidance in the zone of proximal development. This issue was the focus of this study. Although the discussion will focus primarily on the novices' behavior, it is essential to point out that the experts' behavior is equally important--after all, it would be impossible for novices to renegotiate their role if the expert was not willing to enter into a role renegotiation. This study focused on novices because it was our impression from our prior work that most renegotiations of roles were instigated by novices.

Previous work (e.g., Azmitia, 1987) shows a few minutes into the interaction, experts take control of the task and any subsequent role renegotiations (i.e., increases in the novices' participation and control of task decisions) must be instigated by the novice. The present study investigated the conditions that lead novices to renegotiate their roles and the strategies that lead to successful role renegotiation. We hypothesized that novices whose task skills increased would be more likely to renegotiate their role successfully than novices whose competence did not improve. Because experts' control of the task gives novices' little opportunity to participate and detect changes in their competence, we experimentally created this opportunity by training half of the novices to be experts. Their expert partners were unaware of this training, and thus, had no reason to give up control of the task.

Method

Based on a pretest in which Kindergarteners were asked to copy a Lego model, 24 experts (building accuracy > 70%) and 24 novices (building accuracy < 30%) were identified. Same-gender expert-novice pairs were then formed; 12 pairs were randomly assigned to the trained condition and 12 pairs were randomly assigned to the untrained condition.

Two or three days after the pretest, children copied the pretest Lego model with their partner. Children were told to work together to build one copy of the model. Two or three days after this collaborative session, children participated in an individual session in which they copied a new Lego model. All the experts and the novices in the untrained condition were shown the model and asked to copy it by themselves (i.e., they practiced building the new model). Only 2 of these novices increased their pretest building score significantly. The novices in the trained condition were taught building and copying strategies by an adult who used a scaffolding method that ensured that children would be working independently by the end

of the training session. Two or three days after this individual session, children returned for a second collabortive session in which they copied this new model with their original partner. Thus, each child participated in 4 (15 minute) building sessions: (1) an individual pretest, then (2) the first collaborative session, then (3) an individual training session(trained novices only) or an individual practice session (all experts and untrained novices), and then (4) a second collaborative session with their original partner.

Results and Discussion

The key comparisons involve changes in novices' roles from the first to the second collaborative session. A 3- point rating scale was used to assess whether the expert, the novice, or neither child had controlled building decisions. In the first interactive session as expected, most experts soon took control of the task and relegated the novice to a lesser role: 10 experts in the untrained condition and 11 experts in the trained condition were rated as being in control. In the second interactive session (i.e., after the experimental manipulation), 10 experts in the untrained condition and 4 experts in the trained condition controlled task decisions. Thus, after the experimental manipulation, trained novices (N = 8 out of 12) were more likely to renegotiate their role successfully than untrained novices (N = 2 out of 12). A t-test carried out on the change in novices' control ratings from the first to the second collaborative session indicated that this difference in trained and untrained novices' successful role renegotiation was significant, t (22) = 2.68, p <.01. Thus, the results supported the hypothesis. The increase in trained novices' participation was further highlighted by an increase in their contribution to the building (i.e., percent of pieces placed): Although in the first session, trained and untrained novices' contribution did not differ (Ms= 25.25% and 21.83% respectively), in the second session trained novices placed a significantly greater number of pieces (M = 41.33%) than untrained novices (M = 20.58%), F(1,22) = 9.15, p < .01.

Further analyses of the interactions showed that although 21 out of the 24 novices challenged their partners' dominance in the second interactive session, experts resisted role renegotiations. Analyses of negotiation sequences were carried out to assses why trained novices were more successful than untrained novices in role renegotiation. Contrary to predictions, trained novices did not use more sophisticated strategies (e.g., justifications, specifying a role for both partners, compromises) than untrained novices; for both trained and untrained novices, insistence was the modal strategy used during negotiations. Further, even though trained novices were more likely than untrained novices to justify their attempts by alluding to their improved building skill, this justification was no more successful than reminding the partner that they were supposed to work together. What differentiated trained from untrained novices was that trained novices were more persistent in both the frequency of

their attempts and in the length (number of turns) of the negotiation sequence when their attempts to participate were resisted by their expert partner. In contrast, if their initial negotiation attempt failed, untrained novices either disengaged from the task or disrupted their partners' building by getting him/her off task, hoarding pieces, shaking the table, or on occassion, shaking the partner.

These results highlight the novices' role in the renegotiation of the zone of proximal development. More importantly, they broaden our understanding of why expert-novice peer collaborations often fail to promote learning. As highlighted by previous work (e.g., Ellis & Rogoff, 1986; Foot & Morgan, 1988), expert-novice collaborations often fail because the experts do not provide adequate guidance and fail to give up control of the task when the novices' competence has increased. Our data, however, add to the literature by showing that when their skills have improved such that the discrepancy between novices' and experts' skills is small, novices will take responsibility for renegotiating a more equitable distribution of labor and will persist until their partner accepts the new terms. Unfortunately, our data also show that unless they receive individual training from an adult, young novices' skills are unlikely to improve to the degree needed to motivate them to renegotiate their role. It is important to point out that this finding does not imply that novices cannot learn from expert peers. Azmitia (1988) showed that many young novices improved their skills from observing an expert partner build even when the expert did not allow them to participate. These data simply suggest that not all novices will improve in these circumstances and that consequently, this may not be the optimal peer learning context for very young children. Because training novices such that their skills were only slightly discrepant from the experts' resulted in the most renegotiation and novice participation, our data might suggest that Piaget's definition of the degree of asymmetry which is necessary to promote learning from peer collaborations is more accurate than Vygotsky's. However, because we did not include an individual posttest in which we tested the novices' skill, this conclusion needs to be explored further. Finally, a word of caution. Although we concentrated on describing the novices' negotiation strategies, this emphasis does not imply that we consider the experts' negotiation strategies as unimportant. Indeed, we feel that only when expert-novice collaborations are conceptualized as a dynamic relationship and equal attention is paid to both experts and novices' behavior will we have a chance of understanding the facilitation and inhibition of learning in expert-novice peer collaborations. Our emphasis on novices' behavior in this study stemmed both from our impression that novices were more likely to initiate role renegotiations (after all, they have more to gain than experts because experts already control the task) and from our goal of arguing that presently, insufficient attention has been paid to the contribution of novices to their own cognitive development.

Some sample negotiation sequences (how the strategy was coded is in parenthesis):

Novice: I'll do the roofs* (ASSERTS OWN ROLE)

Expert: I wanna do the roof. (takes the roof pieces) (BLOCK)

Novice: If you give me the roofs, you can do all the blues. (COMPLEX ROLE, (DEFINITION: PROPOSE ROLE FOR SELF & OTHER))

Expert. The blues and the door* (ACCEPTS IF NOVICE INCREASES OFFER)

Novice: The door! The door and the yellows (there are more blues than yellows left to do) (COMPROMISE-AMENDS OWN AND EXPERT'S PROPOSAL)

Expert: (hands the roofs to the novice) (ACCEPTS)

*the door and the roofs were children's favorite pieces and thus, were often the object of negotiations

* * * * * * * * * * * *

Novice: You're not letting me help (REQUEST PARTICIPATION)

Expert: I know how to make the house (BLOCK(INDIRECT) + JUSTIFY)

Novice: She said do it together. (JUSTIFIES) I wanna help (reaches for the Lego house) (INSISTS) I know how (JUSTIFY)

Expert: No. (blocks novice's hand) (REFUSE + NONVERBAL BLOCK)

Novice: I know a special trick for the door (the trick is a training strategy) (JUSTIFY + ENTICE)

Expert: What trick? (pushes Lego house towards novice) (ACCEPT + REQUEST MORE INFORMATION)

Novice: (places door)

Expert: I knew that trick (but doesnt take the house back, after this, both take turns)

* * * * * * * * * * * *

Expert: Can I have a yellow three dot? (novice has hoarded them all) (REQUEST PIECE)

Novice: No, these are mine. Use yours. (REFUSE + JUSTIFY)

Expert: But look (points to model). I need a yellow and you have all the yellows. (INSIST, JUSTIFY)

Novice: (shrugs) (REFUSE (indirect))

Expert: Tries to take one of her yellow pieces) (GRAB)

Novice: (blocks expert's hand) (BLOCK, NONVERBAL)

Expert: If you dont give me a 3 dot yellow we wont finish (INSIST+ JUSTIFY)

Novice: (pushes an 8 dot (wrong size) yellow piece towards expert) (COMPLY BUT WRONG PIECE-INTENTIONAL(AS INFERRED FROM SUBSEQUENT ACTION))

Expert: That's the wrong size. I need a 3 dot. (CORRECT, JUSTIFY)

Novice: (shrugs, covers yellow pieces with arms) (BLOCK, HOARD NONVERBAL)

Expert: How about you put it on (pushes copy to novice) Do you want to put one of your 3 dots on? (COMPROMISE + ENTICE (allows novice to place original requested piece)).

Novice: No (continues to cover yellows with arms) (REFUSE, HOARD)

Expert: (after a pause) If you give me a 3 dot I'll give you a quarter when my mom comes to get me.

Novice: (pushes a 3 dot yellow towards the expert) (COMPROMISE, ENTICE (money))

Note: The expert did follow through with payment. Thankfully, the mother was amused when I explained.

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